



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:)
Yar-Ming Wang, Hong-Hsiang Kuo,) Examiner: Edna Wong
Sheila F. Kia)
Serial No.: 09/963,625) Group Art Unit: 1753
Filed: September 27, 2001)
For: Method of Producing Bright)
Anodized Finishes for High Magnesium)
Aluminum Alloys)

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APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Before the Board of Patent Appeals and Interferences

Dear Sir:

REAL PARTY IN INTEREST

This invention is assigned to General Motors Corporation and General Motors Corporation is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

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STATUS OF CLAIMS

Claims 1 and 3-7 are pending in this application. Claim 2 has been cancelled, its limitations having been incorporated into claim 1.

Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korte (US Patent No. 6,309,427) in combination with Gillich (US Patent No. 5,760,981).

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korte in combination with Gillich as applied to claim 1 above, and further in view of Askin et al (US Patent No. 5,616,231) and Komatsubara et al (US Patent No. 5,181,969).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korte in combination with Gillich as applied to claim 5 above, and further in view of Askin et al and Komatsubara et al.

Applicants appeal from these rejections of claims 1 and 3-7.

STATUS OF AMENDMENTS

No amendments were filed after the Examiner's final rejection.

SUMMARY OF INVENTION

The Problem

Workpieces of aluminum and its alloys are oxidized electrolytically as anodes in acidic electrolytes. This process of anodization produces adherent coatings of aluminum oxide characterized by dense porous columns of oxide crystals. Depending upon the composition of the aluminum alloy, the oxide coatings may be clear or they may have an inherent color such as yellow, bronze, grey or even black. Inherently colored anodized aluminum alloy sheets have been used, for example, in decorative architectural applications. On the other hand the clear anodized coatings can be colored by implanting suitable coloring pigments (electrolytically) or dyes in the pores. But whether anodized workpieces are inherently colored or subsequently

colored, the anodizing process must reliably and repeatedly produce uniform surfaces if the practice is to have practical significance. The problem faced by applicants in this application is that certain magnesium containing, aluminum alloys have excellent physical properties, especially in sheet form, for automotive body panel applications. But when they are anodized the porous oxide coatings are coarse and dark and unsuitable for subsequent coloring as commercially acceptable vehicle outer surfaces.

Aluminum Association (AA) alloy 5083 is a commercial aluminum based sheet material having a typical composition comprising, by weight, 4.60% magnesium, 0.79% manganese and small amounts of other additions or retained impurities as described in the specification. AA5083 is cast, hot rolled, cold rolled and heat treated to a sheet metal blank that displays excellent formability properties at forming temperatures of, for example, 450°C to 500°C. The hot sheet material is stretch formed into attractive one-piece vehicle body panels of complex shape. But when such panels are anodized by conventional processes the oxide film is gray to black. Inserting dyes or pigments into the pores does not yield decorative panels. The dark oxide coating masks and distorts the visual effect of subsequent addition of coloring material.

The Invention

This invention provides specific methods for anodizing a limited group of aluminum alloys, those containing more than three percent (claim 1) or four percent (claim 5) by weight magnesium. The methods can be used to repetitively and reproducibly produce clear and glossy porous anodized aluminum oxide films on such aluminum alloy articles for reliable coloring to commercially acceptable finishes. In broadest terms (claim 1), applicants' anodizing method uses low current density anodizing (three to ten amperes per square foot, 3-10 A/ft²) of the aluminum alloy article surface in an aqueous sulfuric acid bath at 18 to 25°C to produce a clear anodized coating for coloring. The process of claim 3, dependent upon claim 1, is conducted prior to anodizing. The surface to be anodized is immersed in an aqueous solution of specified mineral acids at a temperature below 100°F to reduce the magnesium content in the surface to less than three percent and to produce a glossy surface. The process of claim 4, dependent upon claim 3, requires the magnesium

content reduction in aqueous mineral acid to be conducted electrolytically under specified direct current voltage range.

In a more specific embodiment, the invention is applied to making body components for an automotive vehicle (claim 5). The component comprises a formed sheet of an aluminum alloy containing more than four percent by weight magnesium. The formed sheet has a surface requiring a decorative finish. After forming the sheet is anodized using processing parameters as recited in claim 1 to form a clear coating of aluminum oxide having a thickness of about 10 to 25 micrometers. The clear coating is then colored to produce the decorative finish on the body component. The anodizing step of claim 5 may be preceded by the surface treatments of dependent claims 6 and 7 to reduce the magnesium content of the surface layer to less than three percent. Dependent claims 6 and 7 recite the same process steps as dependent claims 3 and 4.

Auger electron analysis for determining surface magnesium content is described at page 8 of the specification. Suitable coloring practices for anodized coatings produced by the claimed anodizing practices are disclosed at pages 11 and 12 of the specification.

The specification describes practices of the invention using superplastically formable (SPF) AA5083 sheet material having a typical composition, by weight, of 4.60% magnesium, 0.79% manganese, 0.10% silicon, 0.02% copper, 0.18% iron, 0.01% zinc, 0.11% chromium, 0.01% titanium and the balance aluminum. In Example 1, small panels of AA5083 were electrolytically treated in 80% aqueous phosphoric acid to reduce the magnesium content at the surfaces of the panels to less than 3% by weight to a depth of one to five micrometers. Reduction of surface magnesium was also illustrated using aqueous phosphoric (80%) and nitric (5%) acids at 90°C without electrical current. Panels were anodized in aqueous sulfuric acid each at a total charge of 300 ampere minutes per square foot of anodized surface to produce anodized layers 7-10 micrometers thick. Current densities were varied from 3 to 25 A/ft². The appearances of the anodized layers differed markedly. One characteristic of surface appearance applicable to colorability is surface gloss. Measurements of surface gloss of the anodized panels were made using a Micro-TRI

Gloss meter. Gloss data vs. current density for the test panels is presented in Figure 1. Coating thickness measurements and surface roughness measurements were also made. The data of Figure 1 show that the surface gloss continually decreased as current density was increased. Considering surface gloss, surface roughness and visual appearance, the surfaces of the panels anodized at a current density of 10A/ft² were only marginally suitable for automotive body surface applications.

In Example 2, another set of AA5083 panels was anodized to a higher total charge of 500 Amp.min/ft² to produce thicker coatings of 15-20 micrometers. The thicker coatings produced a different pattern of gloss data as illustrated in Figure 2, but overall evaluation of the anodized surfaces led to the conclusion that current densities in the range of 5-10 A/ft² produced anodized coatings of sufficient clarity and gloss for coloring.

Confirmation of the Problem in the Art

Interestingly, but not surprisingly, the Komatsubara, et al, U.S. 5,181,969, reference, confirms that conventional anodizing practices produce black or grey anodized coatings on high magnesium content aluminum alloys like AA5083. Komatsubara describes anodizing of SPF sheet alloys of AA5083 composition and processing history. In contrast with applicants' goal in this application, Komatsubara wanted aluminum alloys that, among other characteristics, consistently exhibited a flawless pattern of grey or black color after anodization. Komatsubara's alloys are anodized (see column 12) in 15% aqueous acid at 20°C and at a current density of 1.5 A/dm² (13.9 A/ft² at 1 A/dm² = 9.29 A/ft²) to produce black or grey anodized layers 20 micrometers thick. The same dark anodized layer results are reported when the samples of AA5083 like alloys were etched (polished) in phosphoric acid-nitric acid etching solution at 95°C for 30 seconds prior to anodizing. The Komatsubara et al reference discloses how workers skilled in the art had approached the anodizing of magnesium containing alloys like AA5083 prior to the applicants' present invention. These aluminum alloys are among those that inherently yield dark anodized coatings and Komatsubara et al sought to make them of uniform black or grey appearance. But applicants had an entirely different purpose in mind. They used the alloy because of

its formability and wanted the formed product to have clear anodized coatings so that decorative colors of choice could subsequently be obtained in the porous coatings.

ISSUES

The issue in this appeal with respect to each of claims 1 and 3-7 is whether the combination of references applied by the Examiner with respect to each claim renders any of them obvious under 35 U.S.C. 103(a).

GROUPING OF CLAIMS

Applicants believe that each of the six claims in this appeal represent patentably distinct embodiments of their invention. Therefore, the patentability of each claim will be argued separately.

ARGUMENT

The Claim Limitations.

The anodizing steps in claims 1 and 5 use an aqueous sulfuric acid anodizing bath containing 100-200 grams of sulfuric acid per liter of bath (about 10-20 percent H₂SO₄) at a temperature in the range of 18-25°C. These anodizing parameters are combined with low current density. The practices recited for anodizing in claims 1 and 5 use such combination of anodizing parameters in order to solve the very specific problem that applicants have encountered. The references applied by the Examiner do not recognize or address the problem of obtaining clear anodized coatings for coloring on such magnesium containing aluminum alloys. The color or appearance of the coating on a particular alloy is not predictable from a statement of bath compositions and temperatures.

Claims 3 and 6 recite a process step for reducing the magnesium content in the surface of the aluminum articles to be anodized. The processing step for reducing magnesium content comprises immersing the surface to be anodized in a mineral acid solution at a temperature below about 100 °F. The solution comprises one or more

mineral acids selected from the group consisting of 10-20 percent sulfuric acid, 10-30 percent nitric acid and 40-80 percent phosphoric acid. The immersion is continued until the magnesium content in the surface is reduced to less than 3 percent. This process also produces a glossy surface on the aluminum article, but the intent, requirement and duration of this process step is to reduce the magnesium content in the surface. The Examiner argues that prior art polishing processes would inherently reduce the magnesium content in high magnesium containing aluminum alloys. But the references don't teach how to avoid dark anodized coating on any aluminum alloys. And the operation and duration of claims 3 and 6 is to reduce surface magnesium. The practice of using such a pre-anodizing, magnesium content reducing, mineral acid treatment to facilitate the formation of a clear anodized surface on such an article is not disclosed in the prior art.

Claims 4 and 7 represent a further preferred embodiment of practices recited in claims 3 and 6 in that the immersing step in mineral acid for the reduction of magnesium content is assisted by the use of an electrolysis practice applying a direct current voltage of 10-25 volts to the surface as it is treated in the mineral acid solution. Again, the process of claims 4 and 7 is to be executed to reduce the magnesium content at the surface of the magnesium containing aluminum alloy workpiece or article. The prior art does not show such a practice.

NOTE: Applicants' claims specify current density in amperes per square foot, A/ft². The patent references specify current density in amperes per square decimeter, A/dm². The conversion factor of 1 A/dm² = 9.29 A/ft² is used in this brief.

The Patent References.

Korte, U.S. 6,309,427

The disclosure of the Korte patent reference is directed to dyeing of anodized aluminum oxide layers with certain chromium complex dyes. The Korte disclosure identifies and describes the preparation of a family of such chromium complex dyes that are suitable for insertion into the pores of anodized aluminum films. The Korte chromium complex dyes are soluble in water and, therefore, can serve as anionic dyes for coloring artificially produced oxide layers on aluminum or aluminum alloys (Col.

5, lines 52-54). Korte identifies aluminum alloys and processes for forming oxide layers on aluminum alloy surfaces as applications for his dyes. The gist of his disclosure is that his chromium complex dyes can be used to color all commercial aluminum alloys (Col. 5, lines 55-65) when anodized by all chemical or galvanic (anodic) oxidation processes Col. 5, line 66 through Col.6).

Toward the bottom of column 6, Korte discloses that his dyes can be used to “overdye” aluminum oxide layers that have been “electrolytically predyed.” This refers to anodized coatings that have already been electrolytically colored as described at item 1 at the bottom of page 11 of the subject patent application. But then Korte further states in Column 6 that his dyes can also be used to “...overdye oxide layers predyed by colour anodization (by the process known as integral dyeing) with a dye of the formula (1); in this way too it is possible to obtain muted shades which are particularly suitable, for example, for exterior architecture.” Thus, Korte is not worried about producing clear anodized coatings on anodized aluminum alloy surfaces. Regardless of an inherent color in an anodized coating on some aluminum alloy, Korte proposes to dye it (overdye) anyway.

Korte lists many aluminum alloys, including magnesium containing alloys, as suitable for coloring with his dyes. He describes many anodizing practices for the alloys. Suitable aqueous electrolytic baths include sulfuric acid baths, oxalic acid baths, chromic acid baths, citric acid baths, and baths combining such acids. The anodizing techniques can be used with direct current or alternating current or combinations. The voltages utilized can range from 5 to 80 volts, the temperature of the anodizing can range from 5 - 50°C and the current density can range from 0.3 to 5 amperes per square decimeter ($2.8 \text{ A}/\text{ft}^2$ – $46.4 \text{ A}/\text{ft}^2$).

The Korte reference says nothing about how to deal with anodized coatings that may be black, dark or otherwise discolored (except that they can be overdyed with his chromium dyes). Nor does Korte tell how to avoid the formation of such a dark anodized coating on the surface of an aluminum alloy containing more than three or four percent by weight magnesium. In Korte's application, example D (columns 12 and 13), an aluminum alloy with 1 percent magnesium and 0.5 percent silicon is anodized. The magnesium content of this Example D alloy is below the requirement

of applicants' claims. The Example D workpiece is anodized in a solution of sulfuric acid at a temperature of 18 -20°C at a voltage from 15-17 volts and with a direct current density of 1.5 amperes/dm² (13.9 A/ft²), a current density outside applicants' claims. And there is no description of the color of the anodized coating. The Korte disclosure does not contain any teaching concerning producing clear anodized coatings on AA5083 type aluminum alloys.

Gillich, U.S. 5,760,981

The Gillich reference describes an aluminum reflector with ultra thin composite reflection layers. As illustrated in Figure 1, the reflector includes a reflector body 10, an aluminum layer 20, a very thin intermediate aluminum oxide layer 25 with a specific refractive index, and a very thin outer layer 30 of different oxides and a higher refractive index. The intermediate aluminum oxide layer 25 is a transparent, pore free layer produced by careful oxidation of the surface of the aluminum layer. The thickness of Gillich's non-porous aluminum oxide layer is only 30 nanometers to 190 nanometers. Obviously, Gillich does not make an anodized aluminum oxide layer as produced in applicants' claimed processes. Applicants' anodized layers are much thicker, for example, ten to twenty five micrometers (almost 100 times thicker) and they are porous so that they can be colored.

In his Background description, Gillich describes practices for anodizing aluminum and aluminum alloys in a direct current sulfuric acid electrolyte. He observes that the anodized layer is 1-10 µm thick and characterized by two layers, a pore-free, very thin base or barrier layer and a porous outer layer. But Gillich wants an oxide layer that is pore-free and much thinner. So he doesn't use the direct current sulfuric acid practices that he has described, they are inappropriate for his aluminum oxide reflection layer 25. As described at columns 7-9, Gillich used low concentration electrolytes to produce his nanometer thick, non-porous oxide layer. Of course, none of the Gillich practices are applicable to the formation of colorable aluminum oxide coatings on high magnesium content aluminum alloys.

The Examiner relies on the Gillich's Background description of direct current sulfuric acid electrolyte processes as inherently providing the solution for producing

clear coatings on magnesium containing aluminum alloys as recited in the rejected claims. Yet in this same column 2 disclosure relied upon by the Examiner, Gillich recognizes that only pure aluminum and certain aluminum alloys yield colorless oxide layers by the sulfuric acid processes. And Gillich certainly does not describe any process for clear coat anodizing of aluminum alloys with more than 3 or 4% magnesium. A disclosure is inherently effective only if its specification always works to produce a claimed result. Gillich does not provide any teaching that always produces a clear anodized coating on magnesium containing aluminum alloys.

Askin, et al, U.S. 5,616,231

The Askin, et al. reference is an electrobrightening process for aluminum alloys. The process uses an electropolishing solution of phosphoric acid, sulfuric acid, water and suspended mineral particles. It is intended to produce a very smooth surface on an aluminum alloy. The process is disclosed as being applicable to aluminum alloys of the 5,000 series (Aluminum Association Designation) containing about 0.5 -10 weight percent magnesium but especially those alloys containing about 1.5 weight percent or less magnesium. Other suitable alloys are mentioned. A preferred alloy for use in the process contains only 0.6 - 1 weight percent magnesium (AA5657 alloy).

As stated the Askin process is a brightening process. Possibly, the practice, if applied to an alloy containing more than 3 percent magnesium, could reduce the magnesium content of the surface. But the Askin process is conducted to achieve a surface brightening result, not a surface chemistry change. While the Askin process may be conducted prior to an anodization process, there is nothing in this disclosure that relates this technology to the anodization of magnesium containing aluminum alloys for the purpose of producing clear anodized coatings.

Komatsubara, et al, U.S. 5,181,969.

As described above, Komatsubara, et al describes the preparation of an SPF alloy, like AA5083 used by applicants, which "have an excellent outer appearance of

grey to black color after anodization.” They seek to optimize the composition and processing of their alloys so that they exhibit improved superplastic forming behavior and provide “placid grey to black color in a consistent manner after anodization” (column 2, lines 17-27). Their alloys inherently yield a dark appearance when anodized. Komatusbara, et al seek to make a magnesium containing aluminum alloy material that will avoid streaks or irregular patterns upon anodizing and repeatedly yield the desired inherently formed black color. They do not attempt to avoid the color formation in the anodized material so that it can be subsequently colored to choice.

Komatsubara, et al used anodizing practices within the general disclosures of Korte and Gillich. Komatusbara anodized in a 15% sulfuric acid electrolyte at 20°C and a current density of 1.5A/dm² (13.9 A/ft²) to form black and grey anodized films that were 20 micrometers thick. These practices are outside the recitations of claims 1 and 5 and predictably yield anodized coatings that cannot be colored to choice by a subsequent coloring step. Even when the Komatsubara samples were pre-etched in a phosphoric acid-nitric acid solution they yielded inherently grey or black colors when anodized.

The Combination of References.

The Examiner has cited appellate court opinions pertaining to 35 USC 103(a) obviousness issues. Applicants agree that the disclosures of relevant patent references may be combined to show the state of the prior art with respect to a claim in an application. Applicants also agree that prior art disclosures may contain inherent substance not specifically disclosed. But recognizing all such interpretations of the content of the four references applied by the Examiner, it is applicants’ plea and contention that the stated combinations of the references do not render obvious the inventions recited in any of claims 1 and 3-7.

It is axiomatic in patent law that a patent claim is to be considered in its entirety for purposes of assessing whether certain prior art disclosures render the claimed invention obvious to one skilled in the art. This principle is affirmatively stated, for example, in the DeBlauwe, et al case (222 USPQ 191, Federal Circuit, 1984) cited by the

Examiner. A claimed invention must be considered as a whole in deciding its obviousness. The issue in this appeal is not whether Korte and Gillich and Komatsubara, et al disclose processes for anodizing a magnesium containing aluminum alloy. That issue does not consider the claimed invention as a whole. The issue is whether these references disclose how to produce a clear coating for subsequent coloring on such alloys containing more than three or four percent magnesium. The answer to that question is NO.

The four references relied upon by the Examiner do not present a *prima facie* case of obviousness with respect to any of the rejected claims. Applicants' disclosure and Komatsubara et al teach that certain magnesium containing aluminum alloys form dark aluminum oxide coatings when anodized. Whether considered alone or in combination, the references do not teach how to avoid forming dark anodized coatings on such alloys.

Claim 1 recites specific process parameters for producing a colored bright anodized coating on a surface of an aluminum alloy article containing more than three percent by weight magnesium. The teaching of the specification shows that adherence to the processing parameters is critical to obtaining a clear anodized layer suitable for color finishing. Komatsubara et al demonstrate that operating just outside the claim 1 parameters yields a black or grey anodized coating on an aluminum alloy containing more than three percent of magnesium.

Claim 1 is rejected over Korte in combination with Gillich. Korte discloses that his chromium dyes will color any anodized layer regardless of the inherent color of the oxide layer. And Korte discloses many different anodizing electrolytes (both compositions and concentrations) and processing conditions (temperature, nature of current, voltage and current density). In effect, Korte says that any and all such anodizing practices yield porous oxide layers that his chromium dyes will penetrate regardless of the color of the oxide itself. Gillich also discloses a broad range of direct current sulfuric acid anodizing practices and then teaches that they are unsuitable to make the thin, non-porous aluminum oxide film required for his reflector. The combination of the disclosures of Korte and Gillich summarize anodizing processes for aluminum and many families of its alloys. But the disclosures don't tell one skilled in

the art how to avoid a black anodized layer on an aluminum alloy like AA5083. Indeed, Komatsubara, et al operate within the Korte and Gillich anodizing teachings and are pleased to obtain grey and black anodized layers which they use as is.

The Examiner's position is that applicants' process is suggested somewhere in the encyclopedic scope texts of Korte and Gillich. But this kind of rejection is really based on "obvious to try" grounds. The rejection is based on the proposition that one skilled in the art would somehow be motivated to systematically experiment with every possible process parameter and characteristic mentioned in such disclosures until a clear coating might be obtained on magnesium containing aluminum alloys. But, to support such a ground for claim rejection, the combination of the Korte and Gillich disclosures must suggest some possibility of success in such an open-ended experimental endeavor. However, the Examiner's references don't suggest any solution to avoiding dark oxide coatings on the specified magnesium containing, aluminum alloys. And, contrariwise, Komatsubara teaches that one skilled in the art will get a grey or black coating on magnesium containing aluminum alloys using direct current, sulfuric acid electrolyte anodization. The Examiner's rejection of claim 1 is wholly unsupported by any helpful or logical technical path through the combined references to the result recited in applicants' claims.

Claim 3 is rejected as being unpatentable over Korte in combination with Gillich as applied to claim 1 and further in view of Askin and Komatsubara et al. Claim 3 recites a process step in which the magnesium containing surface to be anodized is immersed in one or more of aqueous sulfuric acid, nitric acid and phosphoric acid in specified amounts until the magnesium content in the surface is reduced to less than three percent. As the acid dissolves magnesium from the surface, the surface is also leveled and becomes glossy. But the stated requirement of the claim 3 step is to reduce surface content of magnesium to avoid subsequent formation of a dark anodized layer unsuitable for coloring. The claim 3 process step is required to be conducted until the magnesium content reduction is obtained, not until a gloss level is obtained.

Askin et al seek to obtain an electrobrightening result and the process is to be performed until that result is obtained. There is no disclosure in Askin or Komatsubara of using mineral acids to reduce surface magnesium content. It is not known whether the

Askin process will reduce magnesium content in surfaces of aluminum alloys containing more than three or four percent magnesium. And there is no teaching in Askin that magnesium reduction will happen in a surface that is then to be anodized. To the contrary, in the companion reference, Komatusbara et al etch their high magnesium content alloys in commercially available phosphoric acid-nitric acid etching solution before anodizing. They still got the grey and black anodized surfaces that they wanted (see columns 12 -13). Clearly, Komatsubara et al did not inherently etch their samples to reduce the surface magnesium content to less than three percent. The combination of four references does not teach or suggest the combination of claims 1 and 3.

Claim 4 is rejected as being unpatentable over Korte in combination with Gillich as applied to claim 1 and further in view of Askin and Komatsubara et al. Claim 4 is dependent upon claims 3 and 1. Claim 4 requires that the immersion step of claim 3 be conducted electrolytically as specified for reducing the magnesium content of the surface to be anodized to less than three percent. As stated, the combination of the process steps of claims 3 and 4 aid in forming the clear anodized coating on the aluminum alloy article. Applicants' arguments in the above paragraphs on behalf of the patentability of claim 3 are applicable to claim 4. Accordingly, they will not be repeated in detail in the interest of brevity. Komatsubara et al do not electrolytically etch the aluminum surface before anodizing. And neither Komatsubara nor Askin teach reducing magnesium surface content to obtain clear anodized coatings for coloring.

Claim 5, like claim 1, is rejected over Korte in combination with Gillich. Claim 5 differs from claim 1 in that claim 5 is directed to making a body component for an automotive vehicle from a sheet of aluminum alloy containing more than four percent by weight magnesium. The formed sheet has a surface requiring a decorative finish, and the finish is a clear anodized coating that is subsequently colored. Applicants' arguments for the patentability of claim 5 are the same as those made on behalf of claim 1.

Claims 6 and 7 relate to claim 5 as claims 3 and 4 relate to claim 1. Applicants' arguments for the patentability of claims 5 +6 and claims 5+6+7 are the same as those advanced on behalf of claims 3 and 4.

In summary, it is respectfully argued that the Examiner's rejections of claims 1 and 3-7 are not justified by the applied combination of prior art patent references. The

combination of references fails to teach or suggest applicants' inventions. Accordingly, it is requested that the rejections be reversed and that claims 1 and 3-7 be allowed.

Respectfully submitted,

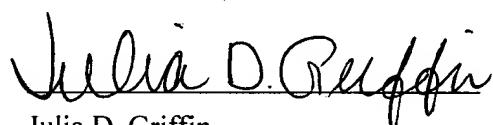
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Julia D. Griffin

APPENDIX

1. A method of forming a colored bright anodized coating on a surface of an aluminum alloy article, where said alloy contains more than three percent by weight magnesium;

anodizing said surface in an aqueous sulfuric acid bath containing 100 to 200 grams of sulfuric acid per liter of bath at a temperature in the range of 18 to 25°C and at a current density in the range of about 3 A/ft² to 10 A/ft² that produces a desired thickness of a clear anodized layer suitable for color finishing; and

coloring said clear anodized layer to produce said colored coating.

2. (canceled)

3. A method as recited in claim 1 in which the following step is conducted prior to said anodizing step,

immersing said surface to be anodized in an aqueous acid solution at a temperature below about 100°F, said solution comprising one or more mineral acids selected from the group consisting of, by weight, ten to twenty percent sulfuric acid, ten to thirty percent nitric acid, and forty to eighty percent phosphoric acid until the magnesium content in said surface is reduced to less than three percent and to produce a glossy surface.

4. A method as recited in claim 3 further comprising, during said immersing step, establishing said surface as an anode in a direct current circuit with said solution as an electrolyte and applying a direct current voltage of 10 to 25 volts to said surface.

5. A method of making a body component for an automotive vehicle, said component comprising a formed sheet of an aluminum alloy containing more than about four percent by weight magnesium, said method comprising

forming said sheet into a body component having a surface requiring a decorative finish,

anodizing said surface in an aqueous sulfuric acid bath comprising 100 to 200 grams per liter of sulfuric acid at a temperature in the range of about 18 to 25°C and at a current density in the range of about three to no more than ten amperes per square foot of said surface to form a clear coating of aluminum oxide having a thickness of about ten to 25 micrometers, and

coloring said clear coating of aluminum oxide to produce said decorative finish.

6. A method as recited in claim 5 in which the following step is conducted prior to said anodizing step,

immersing said surface to be anodized in an aqueous acid solution at a temperature below about 100°F, said solution comprising one or more mineral acids selected from the group consisting of, by weight, ten to twenty percent sulfuric acid, ten to thirty percent nitric acid, and forty to eighty percent phosphoric acid until the magnesium content in said surface is reduced to less than three percent and to produce a glossy surface.

7. A method as recited in claim 6 further comprising, during said immersing step, establishing said surface as an anode in a direct current circuit with said solution as an electrolyte and applying a direct current voltage of 10 to 25 volts to said surface.